Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

memorandum

TO: Distribution

DATE: 10/20/81

FROM: John T. Whetten and Dick Olwin

MAIL STOP/TELEPHONE: 570/6722

SYMBOL: ESS-JTW:81-1009

SUBJECT: HDR FRACTURE PLANNING

We have been asked by DOE in Washington to make program adjustments which reflect different funding scenarios for FY82. We find it impossible to plan the program until the large uncertainties regarding the cost of the Phase II fracture operations are in hand.

The goal of the FY82 fracturing activities is to create "multiple" fractures, thereby connecting the two wellbores, and to flow the new system. It is our understanding that three types of downhole operations are being considered:

1) Cement plugs
2) Perforated liners
3) Open hole packers

We have asked Rod Spence to call a meeting of the Fracture Planning Committee at 8:00 am on Tuesday, October 27, in the ESS-Division Conference Room (White Rock) to provide us with the following information:

1) An evaluation of the three types of downhole operations, including:

   - Cost estimates to perform operation.
     For this analysis, ignore total program budget and concentrate on field costs for each individual option. Please quote technical costs which are as efficient as possible but realistic. Contingencies will be considered later.
   - Time estimates.
   - Potential risks.
   - Technical pros and cons.
   - Other factors (i.e., politics, etc.)

2) A recommendation regarding which operation to follow and why.

OPTION I:

1. Run in 4½" frac string to ~ 500 ft. off bottom
2. Sand up bottom of open hole.
3. Cement in bottom 90 ft. of frac string.
4. Drill out cement.
5. Release rig
6. Pump open hole thru 4½" frac string
   (Could start with Fisher pulsed pressurizations)

Objective of 6, would be to develop as many connections between EE-2 and EE-3 as possible, probably using commercial pumps and high pressures in the final pumping operations.

Advantages: Relatively simple and cheap.
High probability of making a connection.
Might demonstrate a very favorable method of establishing reservoirs.

Disadvantages: Multiple fractures may not develop.
Cementing operation probably difficult.
Flow control not addressed.

OPTION II.

1. Run in Guiberson packer on drill pipe or 4½" frac string.
2. Set packer, pump and extend fracture to EE-3. (If unsuccessful, try again. Probably 3 unsuccessful attempts should be the maximum).
3. Repeat 2. (If unsuccessful try twice more) (Query: Is it necessary to sand up bottom?)
4. Repeat 2 again. Hopefully 3 connections have now been made.
5. Run in 4½" frac string and cement in bottom 90 ft.
6. Drill out cement
7. Release rig.

Advantages: Repetitive operations relatively simple
Fairly good probability of making a connection
Wide latitude in spacing fracture zones.

Disadvantages: Probability of successful operation not considered real high. Therefore costs are hard to predict. (How many attempts to get 3 fracture zones?).
Cementing operation probably difficult.
Flow control not addressed although discrete zones make problem more tractable than in Option I.

OPTION III:

1. Run in a 500 ft. section of 7" scab liner including a PBR (polished bore receptacle).
2. Cement in the liner.
3. Drill out cement.
4. Perforate zone #1. (Various methods available)
5. Stab in + pressurize. Extend fracture to EE-3.
6. Sand up lower zone (or use bridge plug).
7. Perforate zone #2.
8. Stab in, pressurize and extend fracture zone #2.
9. Repeat for 3rd zone and remove sand.
10. Stab in 4½" frac string
11. Release rig.

Advantages: Stabilizes wellbore
Flow control measures can probably be developed.
Latitude in spacing fractures

Disadvantages: Cementing liner may be difficult
Fracture extension somewhat questionable
Perforating near bottom